

Expert system

→ It is a computer system that:

- a) emulates human expert.
- b) is able to solve Real-world Problems.
- c) is able to act as a cost-effective Consultant.
- d) Can explain reasoning behind any solutions it finds.
- e) should be able to learn from Experience.
- f) deals with small, well defined domains of expertise.

→ It manipulates Knowledge while Conventional Programs manipulate data.

* Expert systems development (Es lifecycle)

1) Problem definition:

→ explain problem & collect all data about it.

2) System design (Knowledge acquisitions)

3) Formalization (logical design, , tree structures)

4) system Implementation (building a prototype)

5) System Validation (test your Program)

*characteristics of an Expert system

- 1) Expertise
- 2) Symbolic reasoning.
- 3) Depth
- 4) self Knowledge.

→ How ^{cl}Conclusions are made?

1) Goal Driven reasoning (backward chaining)

↳ an interface technique which uses (if-then) rules to repeatedly break a goal into smaller subgoals which are easier to prove.

2) Data Driven Reasoning:- (Forward chaining)

↳ an interface technique which uses (if-then) rules to deduce a problem solution from initial data.

Expert system Ability

1] Uncertainty:-

↳ ability of system to reason with rules and data which are not precisely known.

2] EXplanations:-

↳ ability of system to explain the reasoning process that it used to reach a recommendation.

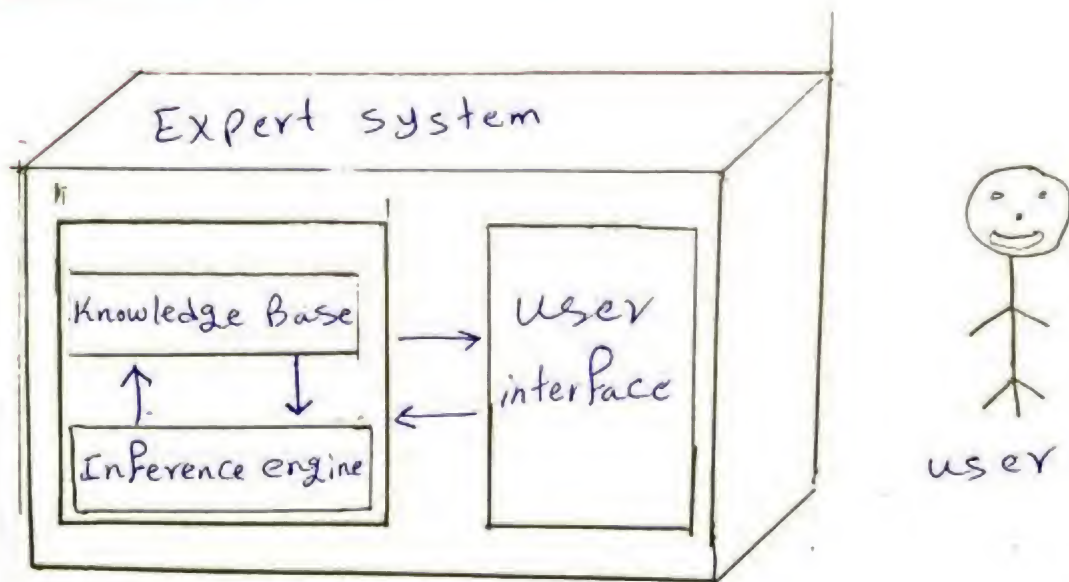
3] user interface

↳ the portion of the code which creates an easy way to use the system.

4] Data Representation

↳ The way in which the problem specific data in the system is stored and accessed.

* Expert system components



1) The Knowledge Base

↳ collection of facts and rules which describe all knowledge about problem domain.

(we get it from experts.)

2] Inference engine:

↳ is the part of the system that chooses which facts and rules to apply when trying to solve user's query.

3] user interface:-

↳ the part of the system that ^{takes in the} ~~chooses~~ ^{while} user's query in readable form and passes it to interface engine. it then displays results to user.

* Advantages of Expert system:-

- a) EXPerts are not always available but an expert system can be used anywhere, any time.
- b) EXPerts may not be good at explaining decisions.
- c) Cost effective. d) superior Problem solving.
- e) Reliability: Human experts not 100% reliable.
- f) work with incomplete information.
- g) transfer of Knowledge.

Disadvantages

- a) High development costs.
- b) limited domain
- c) not all problems are suitable.
- d) Can not learn from experience.
- e) Systems are not always up to date, don't learn.
- f) no common sense.
- g) experts needed to setup & maintain system

*Two steps to create expert system

- 1) Knowledge acquisition: extract Knowledge and methods from experts.
- 2) Knowledge representation: Reforming Knowledge & methods into an organised form.

What is Knowledge

- Data: Raw facts, figures, measurements.
- Information: Refinement and use the data to answer specific questions.
- Knowledge: Refined information.

* sources of Knowledge:-

1 Documented

- ↳ books, Journals, Procedures.
- ↳ films, data bases.

2 undocumented:-

- ↳ People's Knowledge and expertise.
- ↳ People's minds, other senses.

* Types of Knowledge:-

- Facts ex: dogs, teeth.
- Relations ex: mother of Emad.
- Rules ex: IF breathing > 20 then Hyperventilating
- Concepts ex: For All $X \ \& \ Y$
- Procedures ex: Do this then that.